

## Space Technology Demonstrations for Gravitational-Wave Detection

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The detection of gravitational waves requires carefully isolated proof masses. For space gravitational-wave observatories, the time scales of interest are much longer than on the ground. It is also practical in space to let the proof masses freely float rather than constraining them to a nominal average position. A spacecraft can be kept precisely centered on the proof masses to shield the masses from external forces and from changes in the forces on the proof mass from the spacecraft itself. For the proposed LISA mission, there are detailed designs available for the construction of the proof mass, its housing, and surrounding spacecraft. Analysis of known types of forces indicate that the unwanted accelerations on the proof masses can reach  $10^{-16}$  g (the Earth's gravity) for time scales from 1 to 10,000 seconds. However this level of performance is many orders of magnitude less than anything previously demonstrated. To demonstrate the expected level of performance, a number of candidate technology demonstration experiments in space have been considered. The types of experiments proposed and the opportunities for one taking place, will be presented.